

Ethernet Switching Protocols

Link Layer Discovery Protocol Interoperability Test Suite

Version 1.0



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*Ethernet Switching Protocols
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Modification Record

Version	Date	Editor(s)	Comments
0.1	2005-02-10	Curtis Simonson	Initial Draft
0.2	2005-03-01	Curtis Simonson	Major additions and updates
0.3	2005-03-07	Paul Congdon Curtis Simonson	Minor Test Suite revisions Added LLDP.io.1.6
0.4	2005-03-29	Curtis Simonson Eelco Chaudron	Minor Test Suite revisions
0.45		Curtis Simonson	Generalized Test Suite to include test scenarios for all LLDP capable devices
0.5	2005-05-18	Curtis Simonson	Minor revisions and fixes
0.65	2007-07-30	Andrew Corcoran	General Revisions
1.0	20016-07-21	Patrick Lee Alaeric Schuster	Formatting Changes General Revisions Updated Procedures

Introduction

The University of New Hampshire's InterOperability Laboratory (UNH-IOL) is an institution designed to improve the interoperability of standards based products by providing an environment where a product can be tested against other implementations of a standard. This suite of tests has been developed to help implementers evaluate the functionality of their Link Layer Discovery Protocol capable products.

IEEE Std 802.1AB™-2005 states:

“The Link Layer Discovery Protocol (LLDP)...allows stations attached to a 802 LAN to advertise, to other stations attached to the same 802 LAN, the major capabilities provided by the system incorporating that station, the management address or addresses of the entity or entities that provide management of those capabilities, and the identification of the station's point of attachment to the 802 LAN required by those management entity or entities.”

This test suite has been designed based on the set of definitions, principles, requirements and terminology that pertain to IEEE Std 802.1AB™-2005. The test suite is designed to help determine whether or not the DUT will behave in accordance with the standard during normal operation.

These tests are not designed as performance tests. The relative performance of Link Layer Discovery Protocol capable devices (e.g. TLV propagation speed, TLVs supported, etc.) is beyond the scope of this document.

These tests do not determine whether the DUT conforms to IEEE Std 802.1AB™-2005, nor are they designed as conformance tests. Rather, they provide one method to isolate problems within a Link Layer Discovery Protocol capable device that will affect interoperability. Successful completion of all tests contained in this suite does not guarantee that the tested device will operate with other Link Layer Discovery Protocol capable devices. However, combined with satisfactory completion of operations testing, these tests provide a reasonable level of confidence that the DUT will function well in most Link Layer Discovery Protocol capable environments.

Abbreviations and Acronyms

IEEE

BPDU	Bridge Protocol Data Unit
LAN	Local Area Network
LLDP	Link Layer Discovery Protocol
MAC	Media Access Control
MSTP	Multiple Spanning Tree
PHY	Physical Layer
PVID	Port VLAN ID
RSTP	Rapid Spanning Tree Protocol
STP	Spanning Tree Protocol
TLV	Type Length Value
VLAN	Virtual LAN

LLDP Interoperability Test Suite

DUT	Device Under Test
DUT.TS	Port on the DUT connected to Test Station (ex.DUT.TS1 refers to the Port on the DUT connected to Test Station 1)
TS	Test Station (ex. TS1 refers to Test Station 1)

Test Organization

This document organizes tests by group based on related test methodology or goals. Each group begins with a brief set of comments pertaining to all tests within that group. This is followed by a series of description blocks; each block describes a single test. The format of the description block is as follows:

- Test Label:** The Test Label and title comprise the first line of the test block. The Test Label is the concatenation of the short test suite name, group number, and the test number within the group, separated by periods. The test label LLDP.io.1.2 refers to the second test of the first group in the Link Layer Discovery Protocol Interoperability Test Suite.
- Purpose:** The Purpose is a short statement describing what the test attempts to achieve. It is usually phrased as a simple assertion of the feature or capability to be tested.
- References:** The References section lists cross-references to the specifications and documentation that might be helpful in understanding and evaluating the test and results.
- Resource Requirements:** The Resource Requirements section specifies the software, hardware, and test equipment that will be needed to perform the test.
- Discussion:** The Discussion is a general discussion of the test and relevant sections of the specification, including any assumptions made in the design or implementation of the test as well as known limitations.
- Test Setup:** The Default Test Setup section describes the configuration of the DUT prior to the start of the test. The procedure may involve configuration steps that deviate from what is given in the test setup. If a value is not provided for a protocol parameter, then the protocol's default is used for that parameter.
- Test Procedure:** This section of the test description contains the step-by-step instructions for carrying out the test. These steps include such things as enabling interfaces, disconnecting links between devices, and sending MAC frames from a Test Station. The test procedure may also cue the tester to make observations, which are interpreted in accordance with the observable results given for that test part.
- Observable Results:** This section lists observable results that can be examined by the tester to verify that the DUT is operating properly. When multiple observable results are possible, this section provides a short discussion on how to interpret them. The determination of a pass or fail for each test is usually based on how the behavior of the DUT compares to the results described in this section.
- Possible Problems:** This section contains a description of known issues with the test procedure, which may affect test results in certain situations.

Group 1: Basic LLDP.io

Scope:

To verify the behavior of the LLDP capable DUT when placed in a Test Network with an LLDP capable Link Partner.

Test LLDP.io.1.1 — Mandatory LLDP TLVs

Purpose: To verify that the DUT can properly exchange mandatory TLV information with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: sub-clause 10.5.1
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

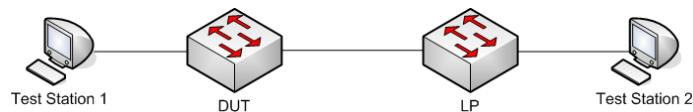
Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner; specifically the mandatory TLVs defined in IEEE Std. 802.1AB-2005 Table 9-1.

The three defined mandatory TLVs are: Chassis ID TLV, Port ID TLV and Time To Live TLV; these mandatory TLVs must be included in all LLDPDUs in the order listed above. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the mandatory TLVs. Information exchanged in the TLVs must be stored in an accessible format, such as SNMP.

This test also verifies the proper operation of the adminStatus parameter, which controls the operating mode of the System's LLDP agent. The adminStatus parameter can be configured to one of the following values: enabledTxRx, enabledTxOnly, enabledRxOnly, disabled.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Mandatory LLDP TLVs - DUT adminStatus = enabledTxRx

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Wait 31 seconds.

Part B: Mandatory LLDP TLVs - DUT adminStatus = enabledTxOnly

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set the DUT's adminStatus parameter to enabledTxOnly.
3. Wait 31 seconds.

Part C: Mandatory LLDP TLVs - DUT adminstatus = enabledRxOnly

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set the DUT's adminStatus parameter to enabledRxOnly.
3. Wait 31 seconds.

Observable Results:

Part A:

- In step 2, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 2, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 2, The LLDP Remote System mandatory TLV information on the DUT and LPL must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 3, TS1 and TS2 must capture properly formatted LLDPUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT must not correlate to the characteristics of the LP.
- In step 3, the LLDP Remote System mandatory TLV information on the LP must correlate to the characteristics of the DUT.

Part C:

- In step 3, TS1 and TS2 must capture properly formatted LLDPUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT must correlate to the characteristics of the LP.
- In step 3, the LLDP Remote System mandatory TLV information on the LP must not correlate to the characteristics of the DUT.

Possible Problems: None.

Test LLDP.io.1.2 — Optional LLDP TLVs

Purpose: To verify that the DUT can properly exchange optional TLV information with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: sub-clause 10.5.1
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the optional TLVs defined in IEEE Std. 802.1AB-2005 Table 9-1.

The five defined optional TLVs are: PortDescription TLV, System TLV, System Description TLV, System Capabilities TLV and Management Address TLV; the optional TLVs may be included in the LLDPDU as determined by the implementer and/or device configuration. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. In this Test the DUT and LLDP capable Link Partner must exchange the information contained in the optional TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format, such as SNMP.

This test also verifies the proper operation of the adminStatus parameter, which controls the operating mode of the System's LLDP agent. The adminStatus parameter can be configured to one of the following values: enabledTxRx, enabledTxOnly, enabledRxOnly, disabled.

The LP's adminStatus parameter is set to enabledTxRx, during the entire test. The LLDPDUs captured by Test Stations 1 and 2 will only contain the optional TLVs supported by the DUT and LP, respectively. The Remote System and Local System information on the DUT and LP will reflect the optional TLVs supported by the respective devices.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Optional LLDP TLVs - DUT adminStatus = enabledTxRx

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set all of the DUT's optional TLVs to enabled for transmission.
3. Wait 31 seconds.

Part B: Optional LLDP TLVs - DUT adminStatus = enabledTxOnly

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set all the DUT's optional TLVs to enabled for transmission.
3. Set the DUT's adminStatus parameter to enabledTxOnly.
4. Wait 31 seconds.

Part C: Optional LLDP TLVs - DUT adminStatus = enabledRxOnly

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set all the DUT's optional TLVs to enabled for transmission.
3. Set the DUT's adminStatus parameter to enabledRxOnly.
4. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the optional TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System optional TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System optional TLV information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the optional TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System optional TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System optional TLV information on the DUT must not correlate to the characteristics of the LP.
- In step 3, the LLDP Remote System optional TLV information on the LP must correlate to the characteristics of the DUT.

Part C:

- In step 4, TS1 must not capture LLDPDUs.
- In step 4, TS2 must capture properly formatted LLDPDUs containing the optional TLVs and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System optional TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System optional TLV information on the DUT must correlate to the characteristics of the LP.
- In step 4, the LLDP Remote System optional TLV information on the LP must not contain the characteristics of the DUT.

Possible Problems: None.

Test LLDP.io.1.3 — Network (re)Initialization - Mandatory LLDP TLVs

Purpose: To verify that, during network (re)initialization, the DUT can properly exchange mandatory TLV information with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: sub-clause 10.5.1
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This Test verifies that, during network (re)initialization, the DUT can properly exchange information with an LLDP capable Link Partner, specifically the mandatory TLVs defined in IEEE Std. 802.1AB-2005 Table 9-1.

The three defined mandatory TLVs are: Chassis ID TLV, Port ID TLV and Time To Live TLV; the mandatory TLVs must be included in all LLDPDUs in the order listed above. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the mandatory TLVs. Information exchanged in the TLVs must be stored in an accessible format, such as SNMP.

In Part D, a delay of 152 seconds is used to ensure that the DUT has sufficient time to clear the LLDP Remote System information.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Network initialization - Mandatory LLDP TLVs

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Reboot the DUT and LP.
3. After the DUT and LP have finished booting, wait 31 seconds.

Part B: DUT initialization - Mandatory LLDP TLVs

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Disconnect power from the DUT.
3. Connect power to the DUT.
4. After the DUT has finished booting, wait 31 seconds.

Part C: LP initialization - Mandatory LLDP TLVs

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Disconnect power from the LP.
3. Connect power to the LP.
4. After the LP has finished booting, wait 31 seconds.

Part D: Ageing of Information - Mandatory LLDP TLVs

1. Ensure the DUT and LP are configured to the test setup as defined above
2. Disconnect power from the LP.
3. Wait 152 seconds.

Observable Results:

Part A:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 2, TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 2, the LLDP Local System mandatory TLV information on the LP must correlate to the characteristics of the LP.
- In step 2, the LLDP Remote System mandatory TLV information on the LP must correlate to the characteristics of the DUT.
- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System mandatory TLV information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part C:

- In step 2, TS1 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 2, the LLDP Local System mandatory TLV information on the DUT must correlate to the characteristics of the DUT.
- In step 2, the LLDP Remote System mandatory TLV information on the DUT must correlate to the characteristics of the LP.
- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System mandatory TLV information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part D:

- In step 3, TS1 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, TS2 must not capture LLDPDUs.
- In step 3, the LLDP Local System mandatory TLV information on the DUT must correlate to the characteristics of the DUT.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT must not correlate to the characteristics of the LP.

Possible Problems: None.

Test LLDP.io.1.4 — Network Shutdown - Mandatory LLDP TLVs

Purpose: To verify that, during network shutdown, the DUT can properly exchange optional TLV information with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: sub-clause 10.5.1
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

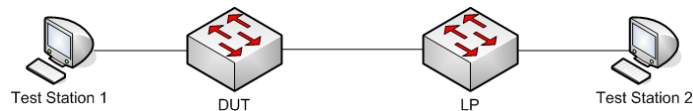
Discussion: This test verifies that, during network shutdown, the DUT can properly exchange information with an LLDP capable Link Partner, specifically the mandatory TLVs defined in IEEE Std. 802.1AB-2005 Table 9-1.

The three defined mandatory TLVs are: Chassis ID TLV, Port ID TLV and Time To Live TLV; the mandatory TLVs must be included in all LLDPDUs in the order listed above. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the mandatory TLVs. Information exchanged in the TLVs must be stored in an accessible format, such as SNMP.

This test also verifies the proper operations of the DUT's LLDP Shutdown Procedure and the adminStatus parameter, which controls the operating mode of the DUT's LLDP Agent. The LLDP Shutdown Procedure is invoked when the LLDP Agent determines that a Port is about to become non-operational. The LLDP Shutdown Procedure causes an LLDPDU to be transmitted with a TTL value of zero, indicating that the LP should clear the Remote System information associated with the non-operational Port. The adminStatus parameter can be configured to one of the following values: enabledTxRx, enabledTxOnly, enabledRxOnly, disabled.

During this test, an adminStatus parameter value of disabled is used to simulate network shutdown.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Mandatory LLDP TLVs - DUT adminStatus = disabled

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set the DUT's adminStatus parameter to disabled.
3. Wait 31 seconds.

Part B: Mandatory LLDP TLVs - LP adminStatus = disabled

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set the LP's adminStatus parameter to disabled.
3. Wait 31 seconds.

Part C: Mandatory LLDP TLVs - Proper Shutdown Procedure

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Invoke the DUT's LLDP Shutdown Procedure.
3. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1 must not capture LLDPDUs.
- In step 3, TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT must correlate to the characteristics of the DUT.
- In step 3, the LLDP Local System mandatory TLV information on the LP must correlate to the characteristics of the LP.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT must not be accessible.
- In step 3, the LLDP Remote System mandatory TLV information on the LP must correlate to the characteristics of the DUT.

Part B:

- In step 3, TS1 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, TS2 must not capture LLDPDUs.
- In step 3, the LLDP Local System mandatory TLV information on the DUT must correlate to the characteristics of the DUT.
- In step 3, the LLDP Local System mandatory TLV information on the LP must correlate to the characteristics of the LP.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT must not correlate to the characteristics of the LP.
- In step 3, the LLDP Remote System mandatory TLV information on the LP must not be accessible.

Part C:

- In step 3, TS1 must not capture LLDPDUs.
- In step 3, TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System mandatory TLV information on the DUT must correlate to the characteristics of the DUT.
- In step 3, the LLDP Local System information on the LP must correlate to the characteristics of the LP.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT must not be accessible.
- In step 3, the LLDP Remote System mandatory TLV information on the LP must correlate to the characteristics of the DUT.

Possible Problems: None.

Test LLDP.io.1.5 — Port Failure - Mandatory LLDP TLVs

Purpose: To verify the behavior of the DUT when a failure occurs on the link to a LLDP capable Link Partner.

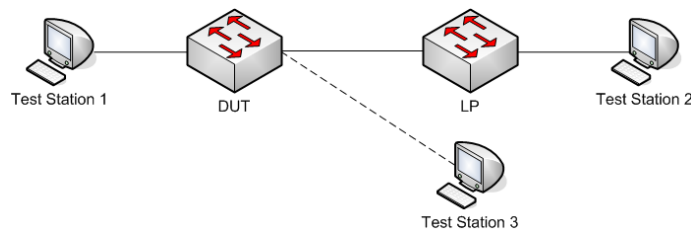
References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [3] IEEE Std. 802.1AB-2005: sub-clause 10.2
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3

Resource Requirements: 3 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This test verifies that the DUT exhibits the proper behavior when a failure occurs on the link to a LLDP capable Link Partner. IEEE Std. 802.1AB-2005 subclause 10.3.7 states that if a failure occurs on the link to the Remote System, before a shutdown LLDPDU is received, the LLDP agent shall not delete the Remote System information until the Port is re-initialized or the associated TTL timer expires.

The DUT and a LLDP capable Link Partner must exchange the information contained in the mandatory TLVs, prior to link failure. Information exchanged in the TLVs must be stored in an accessible format, such as SNMP, and appropriately maintained during link failure.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Link Failure

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Disconnect the link between the DUT and LP.
3. Wait 31 seconds.

Part B: Link Re-initialization

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Disconnect the link between the DUT and LP.
3. Connect Test Station 3 to the Port on the DUT previously included in the link connected to the LP.
4. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 2, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 2, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 2, the LLDP Remote System mandatory TLV information on the DUT and LP must contain the characteristics of the LP and DUT, respectively.
- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System mandatory TLV information on the DUT must not correlate to the characteristics of the LP.
- In step 4, the LLDP Remote System mandatory TLV information on the LP must correlate to the characteristics of the DUT.

Possible Problems: None.

Test LLDP.io.1.6 — LLDP.io in a Spanning Tree environment - Mandatory LLDP TLVs

Purpose: To verify that the DUT can properly exchange mandatory TLV information with an LLDP capable Link Partner, in a Spanning Tree enabled network, with links in the Blocking State.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.2
[2] IEEE Std. 802.1AB-2005: clause 6 [5] IEEE Std. 802.1AB-2005: sub-clause 10.3
[3] IEEE Std. 802.1AB-2005: sub-clause 10.1

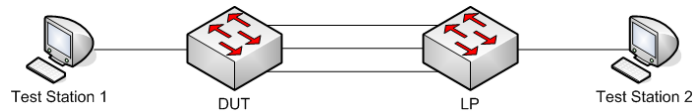
Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This test verifies that the DUT can properly exchange the mandatory TLVs with an LLDP capable Link Partner, when configured in a Spanning Tree network with links in the Blocking State.

The DUT is placed in a network with three redundant links between the DUT and its LP. Due to the operation of Spanning Tree, two of the links are placed in the Blocking State. IEEE Std. 802.1AB-2005 Clause 6 stipulates that, since LLDP operates as an LLC procedure, it is not affected by the Spanning Tree state of the Bridge Port.

This test is applicable if and only if the DUT supports the Spanning Tree Protocol.

Test Setup: Refer to the default test setup in Appendix A.
Enable Spanning Tree Protocol on the DUT and LP.



Test Procedure:

Part A: LLDP in a Spanning Tree environment - Mandatory LLDP TLVs when the DUT is Root

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Configure the DUT and LP such that the DUT is the Root Bridge.
3. Wait 31 seconds.

Part B: LLDP in a Spanning Tree environment - Mandatory LLDP TLVs when the DUT is not Root

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Configure the DUT and LP such that the LP is the Root Bridge.
3. Wait 31 seconds.

Observable Results:

Parts A and B:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the three mandatory TLVs and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System mandatory TLV information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System mandatory TLV information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.
- The Remote System information on the DUT and LP must correlate to information indicating the three links between the two Systems.

Possible Problems: None.

Group 2: LLDP.io - IEEE 802.1 Organizationally Specific LLDP TLVs

Scope:

To verify the behavior of the LLDP capable DUT in an LLDP enabled network running IEEE 802.1 Protocols.

Test LLDP.io.2.1 — IEEE 802.1 Organizationally Specific TLVs - VLANs

Purpose: To verify that the DUT can properly exchange the IEEE 802.1 Organizationally Specific VLAN TLVs with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: Annex F
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

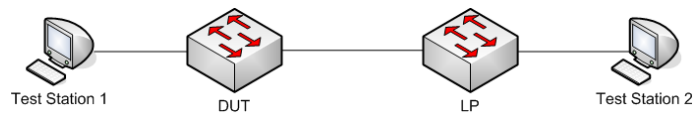
Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the IEEE 802.1 Organizationally Specific VLAN TLVs defined in IEEE Std. 802.1AB-2005 Table F-1.

The four defined IEEE 802.1 TLVs are: Port VLAN ID TLV, Port and Protocol VLAN ID TLV, VLAN Name TLV and Protocol Identity TLV; the IEEE 802.1 TLVs may be included in the LLDPDU as determined by the implementer. All LLDPDUs shall be terminated with the End Of LLDPDU TLV.

The DUT and LLDP capable Link Partner must exchange the information contained in the IEEE 802.1 TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format such as SNMP.

This test is applicable if and only if the DUT supports the IEEE 802.1 Organizationally Specific TLVs.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Port VLAN ID TLV

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the Port VLAN ID TLV.
3. Wait 31 seconds.

Part B: Port and Protocol VLAN ID TLV

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the Port and Protocol VLAN ID TLV.
3. Wait 31 seconds.

Part C: VLAN Name TLV

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the VLAN Name TLV.
3. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the Port VLAN ID TLV and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the Port and Protocol VLAN ID TLV(s) and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part C:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the VLAN Name TLV(s) and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System Information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Possible Problems: None.

Test LLDP.io.2.2 — IEEE 802.1 Organizationally Specific TLVs - Spanning Tree

Purpose: To verify that the DUT can properly exchange the IEEE 802.1 Organizationally Specific Protocol Identity TLVs, containing Spanning Tree information, with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: Annex F
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

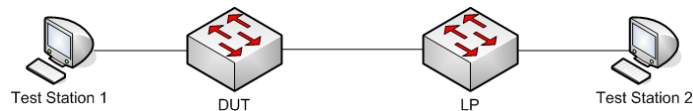
Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the IEEE 802.1 Organizationally Specific Protocol Identity TLVs defined in IEEE Std. 802.1AB-2005 Table F-1.

The IEEE 802.1 Protocol Identity TLV allows the implementer to advertise protocols supported by the Link, such as Spanning Tree versions; the IEEE 802.1 Protocol Identity TLV may be included in the LLDPDU as determined by the implementer. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the IEEE 802.1 TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format such as SNMP.

The Protocol Identity TLV's protocol identity information string contains the first N octets of the Protocol Data Unit after the layer 2 addresses. The value of N is chosen such that the protocol identity information string contains enough octets for the receiver to properly identify the protocol and protocol version.

This test is applicable if and only if the DUT supports the IEEE 802.1 Organizationally Specific TLVs, as well as the IEEE 802.1Q Organizationally Specific Protocol identity TLV for Spanning Tree.

Test Setup: Refer to the default test setup in Appendix A.
Enable Spanning Tree Protocol on the DUT and LP.



Test Procedure:

Part A: Spanning Tree - Version 0

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set the DUT's and LP's Force Protocol Version parameter to 0.
3. Enable transmission of the Spanning Tree Protocol Identity TLV.
4. Wait 31 seconds.

Part B: Rapid Spanning Tree - Version 2

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set the DUT's and LP's Force Protocol Version parameter to 2.
3. Enable transmission of the Spanning Tree Protocol Identity TLV.
4. Wait 31 seconds.

Part C: Multiple Spanning Tree - Version 3

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Set the DUT's and LP's Force Protocol Version parameter to 3.
3. Enable transmission of the Spanning Tree Protocol Identity TLV.
4. Wait 31 seconds.

Observable Results:

Part A:

- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the Protocol Identity TLV, corresponding to Spanning Tree version 0, and the End Of LLDPDU TLV.
- In step 4, TS1 and TS2 must capture properly formatted ST BPDUs.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the Protocol Identity TLV, corresponding to Spanning Tree version 2, and the End Of LLDPDU TLV.
- In step 4, TS1 and TS2 must capture properly formatted RST BPDUs.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part C:

- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the Protocol Identity TLV, corresponding to Spanning Tree version 3, and the End Of LLDPDU TLV.
- In step 4, TS1 and TS2 must capture properly formatted MST BPDUs.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Possible Problems: None.

Group 3: LLDP.io - IEEE 802.3 Organizationally Specific LLDP TLVs

Scope:

To verify the behavior of the LLDP capable DUT in an LLDP enabled network running IEEE 802.3 Protocols.

Test LLDP.io.3.1 — IEEE 802.3 Organizationally Specific TLVs - MAC/PHY

Purpose: To verify that the DUT can properly exchange the IEEE 802.3 Organizationally Specific MAC/PHY TLV with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: Annex G
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

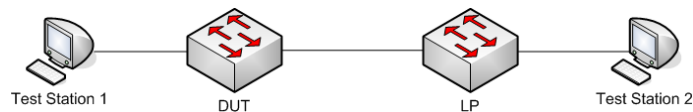
Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the IEEE 802.3 Organizationally Specific MAC/PHY TLV defined in IEEE Std. 802.1AB-2005 Table G-1.

The four defined IEEE 802.3 TLVs are: MAC/PHY Configuration/Status TLV, Power Via MDI TLV, Link Aggregation TLV and Maximum Frame Size TLV; the IEEE 802.3 TLVs may be included in the LLDPDU as determined by the implementer. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the IEEE 802.3 TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format such as SNMP.

This test is applicable if and only if the DUT supports the IEEE 802.3 Organizationally Specific TLVs.

Parts B and C cannot be completed if the DUT does not support Auto-Negotiation.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: MAC/PHY TLV - Default Configuration

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the MAC/PHY Configuration/Status TLV.
3. Wait 31 seconds.

Part B: MAC/PHY TLV - Auto-negotiation supported/enabled

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable auto-negotiation on all ports on the DUT and LP.
3. Enable transmission of the MAC/PHY Configuration/Status TLV.
4. Wait 31 seconds.

Part C: MAC/PHY TLV - Auto-negotiation supported/disabled

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Disable Auto-negotiation on all Ports on the DUT and LP.
3. Enable transmission of the MAC/PHY Configuration/Status TLV.
4. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the MAC/PHY TLV, corresponding the default configuration of the DUT and LP, respectively, and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the MAC/PHY TLV, indicating the Auto-negotiation is supported and enabled on the DUT and LP, respectively, and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part C:

- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the MAC/PHY TLV, indicating that Auto-negotiation is supported but disabled on the DUT and LP, respectively, and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Possible Problems: None.

Test LLDP.io.3.2 — IEEE 802.3 Organizationally Specific TLVs - Power Via MDI

Purpose: To verify that the DUT can properly exchange the IEEE 802.3 Organizationally Specific Power Via MDI TLV with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: Annex G
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the IEEE 802.3 Organizationally Specific Power Via MDI TLV defined in IEEE Std. 802.1AB-2005 Table G-1.

The four defined IEEE 802.3 TLVs are: MAC/PHY Configuration/Status TLV, Power Via MDI TLV, Link Aggregation TLV and Maximum Frame Size TLV; the IEEE 802.3 TLVs may be included in the LLDPDU as determined by the implementer. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the IEEE 802.3 TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format such as SNMP.

This test is applicable if and only if the DUT supports the IEEE 802.3 Organizationally Specific TLVs. Parts B and C cannot be completed if the DUT does not support Power Via MDI.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Power Via MDI - Default Configuration

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the Power Via MDI TLV.
3. Wait 31 seconds.

Part B: Power Via MDI - supported/enabled

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable Power Via MDI on all Ports on the DUT and LP.
3. Enable transmission of the Power Via MDI TLV.
4. Wait 31 seconds.

Part C: Power Via MDI - supported/disabled

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Disable Power Via MDI on all Ports on the DUT and LP.
3. Enable transmission of the Power Via MDI TLV.
4. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the Power Via MDI TLV, corresponding to default capabilities of the DUT and LP, respectively and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the Power Via MDI TLV, indicating that Power Via MDI is supported and enabled on the DUT and LP, respectively, and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part C:

- In step 4, TS1 and TS2 must capture properly formatted LLDPDUs containing the Power Via MDI TLV, indicating that Power Via MDI is supported but disabled on the DUT and LP, respectively, and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Possible Problems: None.

Test LLDP.io.3.3 — IEEE 802.3 Organizationally Specific TLVs - Link Aggregation

Purpose: To verify that the DUT can properly exchange the IEEE 802.3 Organizationally Specific Link Aggregation TLV with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: Annex G
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

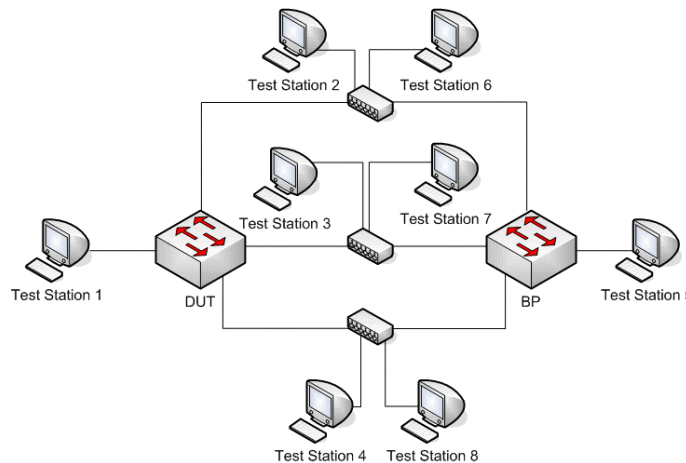
Resource Requirements: 8 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the IEEE 802.3 Organizationally Specific Link Aggregation TLV defined in IEEE Std. 802.1AB-2005 Table G-1.

The four defined IEEE 802.3 TLVs are: MAC/PHY Configuration/Status TLV, Power Via MDI TLV, Link Aggregation TLV and Maximum Frame Size TLV; the IEEE 802.3 TLVs may be included in the LLDPDU as determined by the implementer. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the IEEE 802.3 TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format such as SNMP.

This test is applicable if and only if the DUT supports the IEEE 802.3 Organizationally Specific TLVs. Parts B and C cannot be completed if the DUT does not support Link Aggregation.

Test Setup: Refer to the default test setup in Appendix A.
Aggregate all links connecting the DUT to the LP.



Test Procedure:

Part A: Link Aggregation - Disabled/Inactive

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the Link Aggregation TLV.
3. Wait 31 seconds.

Part B: Link Aggregation - Enabled/Inactive

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable Link Aggregation on all Ports on the DUT and LP.
3. Enable transmission of the Link Aggregation TLV.
4. Wait 31 seconds.

Part C: Link Aggregation - Enabled/Active

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable Link Aggregation on all Ports on the DUT and LP. Ensure a Link Aggregation comprised of the Ports connecting the DUT and LP is created and active.
3. Enable transmission of the Link Aggregation TLV.
4. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1, TS2, TS3, and TS4 must capture properly formatted LLDPDUs containing the Link Aggregation TLV, corresponding to the configured settings of the DUT, and the End of LLDPDU TLV.
- In step 3, TS5, TS6, TS7, and TS8 must capture properly formatted LLDPDUs containing the Link Aggregation TLV, corresponding to the configured settings of the LP, and the End of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part B:

- In step 4, TS1, TS2, TS3, and TS4 must capture properly formatted LLDPDUs containing the Link Aggregation TLV, corresponding to the configured settings of the DUT, and the End Of LLDPDU TLV.
- In step 4, TS5, TS6, TS7, and TS8 must capture properly formatted LLDPDUs containing the Link Aggregation TLV, corresponding to the configured settings of the LP, and the End of LLDPDU TLV.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Part C:

- In step 4, TS1, TS2, TS3, and TS4 must capture properly formatted LLDPDUs containing the Link Aggregation TLV, corresponding to the configured settings of the DUT, and the End Of LLDPDU TLV.
- In step 4, TS5, TS6, TS7, and TS8 must capture properly formatted LLDPDUs containing the Link Aggregation TLV, corresponding to the configured settings of the LP, and the End Of LLDPDU TLV.
- In step 4, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 4, the LLDP Remote System information on the DUT must correlate to the characteristics of the LP and DUT, respectively.

Possible Problems: None.

Test LLDP.io.3.4 — IEEE 802.3 Organizationally Specific TLVs - Maximum Frame Size

Purpose: To verify that the DUT can properly exchange the IEEE 802.3 Organizationally Specific Maximum Frame Size TLV with an LLDP capable Link Partner.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.3
[2] IEEE Std. 802.1AB-2005: sub-clause 10.1 [5] IEEE Std. 802.1AB-2005: Annex G
[3] IEEE Std. 802.1AB-2005: sub-clause 10.2

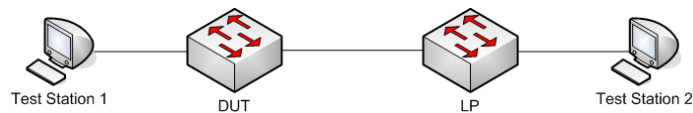
Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the IEEE 802.3 Organizationally Specific Maximum Frame Size TLV defined in IEEE Std. 802.1AB-2005 Table G-1.

The four defined IEEE 802.3 TLVs are: MAC/PHY Configuration/Status TLV, Power Via MDI TLV, Link Aggregation TLV and Maximum Frame Size TLV; the IEEE 802.3 TLVs may be included in the LLDPDU as determined by the implementer. All LLDPDUs shall be terminated with the End Of LLDPDU TLV. The DUT and LLDP capable Link Partner must exchange the information contained in the IEEE 802.3 TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format such as SNMP.

This test is applicable if and only if the DUT supports the IEEE 802.3 Organizationally Specific TLVs.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A: Maximum Frame Size - Default Configuration

1. Ensure the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the Maximum Frame Size TLV.
3. Wait 31 seconds.

Observable Results:

Part A:

- In step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the Maximum Frame Size TLV, corresponding to default capabilities of the DUT and LP, respectively, and the End Of LLDPDU TLV.
- In step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, the LLDP Remote System information on the DUT and LP must correlate to the characteristics of the LP and DUT, respectively.

Possible Problems: None.

Group 4: LLDP.io - Organizationally Specific LLDP TLVs

Scope: To verify the behavior of the LLDP capable DUT in an LLDP enabled network running Organizationally Specific Protocols.

Test LLDP.io.4.1 — Organizationally Specific TLVs

Purpose: To verify that the DUT can properly exchange the Organizationally Specific TLVs with its Link Partner, an LLDP capable System.

References: [1] IEEE Std. 802.1AB-2005: Table 9-1 [4] IEEE Std. 802.1AB-2005: sub-clause 10.2
[2] IEEE Std. 802.1AB-2005: sub-clause 9.6 [5] IEEE Std. 802.1AB-2005: sub-clause 10.3
[3] IEEE Std. 802.1AB-2005: sub-clause 10.1

Resource Requirements: 2 Test Stations capable of transmitting and receiving arbitrary MAC frames.

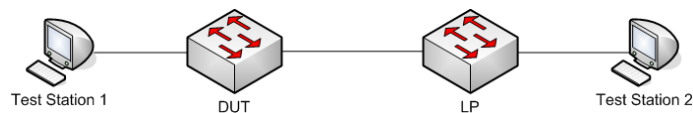
Discussion: This test verifies that the DUT can properly exchange information with an LLDP capable Link Partner, specifically the Organizationally Specific TLVs whose format is defined in IEEE Std. 02.1AB-2005 subclause 9.6.

The Organizationally Specific TLVs are designed to allow organizations and vendors to define TLVs that advertise information to directly connected LLDP entities; the Organizationally Specific TLVs have a specifically defined TLV format that must be adhered to and may be included in the LLDPDU as determined by the implementer. All LLDPDUs shall be terminated with the End Of LLDPDU TLV.

The DUT and LLDP capable Link Partner must exchange the information contained in the IEEE 802.3 TLVs supported by the DUT and LP. Information exchanged in the TLVs must be stored in an accessible format such as SNMP.

This test is applicable if and only if the DUT supports at least one Organizationally Specific TLV.

Test Setup: Refer to the Default Test Setup in Appendix A.



Test Procedure:

Part A:

1. Ensure that the DUT and LP are configured to the test setup as defined above.
2. Enable transmission of the Organizationally Specific TLV.
3. Wait 31 seconds.
4. Repeat steps 2 and 3 for each Organizationally Specific TLV supported by the DUT.

Observable Results:

Part A:

- In step 3, and each repetition of step 3, TS1 and TS2 must capture properly formatted LLDPDUs containing the Organizationally Specific TLV(s), corresponding to configured capabilities of the DUT and LP, respectively, and the End Of LLDPDU TLV.
- In step 3, and each repetition of step 3, the LLDP Local System information on the DUT and LP must correlate to the characteristics of the DUT and LP, respectively.
- In step 3, and each repetition of step 3, the LLDP Remote System information on the DUT and LP must contain the characteristics of the LP and DUT, respectively.

Possible Problems: None.

Appendix A

Unless otherwise specified, all tests in this group will use the following default values:

Default Settings: DUT and LP:

Bridge Settings:

802.1X operating state: **Disabled**
LLDP Bridge entity state: **Enabled**
STP operating state: **Disabled**
txTTL: **120 seconds (4 * 30 = 120)**
msgTxHold: **4**
msgTxInterval: **30 seconds**
reinitDelay: **2 seconds**
txDelay: **2 seconds**

Port Settings:

LLDP Port entity adminStatus parameter: **enabledTxRx**
Port VLAN ID: **1**
Name associated with VLAN 1: **Default**

Note - Port settings apply to all Ports on the DUT and LP